

(12) **UK Patent Application** (19) **GB** (11) **2 240 948** (13) **A**  
(43) Date of A publication **21.08.1991**

(21) Application No **9102980.1**

(22) Date of filing **13.02.1991**

(30) Priority data  
(31) **9003446** (32) **15.02.1990** (33) **GB**

(71) Applicant  
**Peter Robert Peter Sunman**  
**10 Boleyn Walk, Penylan, Cardiff, CF2 5HR,**  
**United Kingdom**

(72) Inventor  
**Peter Robert Peter Sunman**

(74) Agent and/or Address for Service  
**Spence & Townsend**  
**Mill House, Wandle Road, Beddington, Croydon,**  
**Surrey, CR0 4SD, United Kingdom**

(51) INT CL<sup>5</sup>  
**B42D 15/10 // B42D 201:00 203:00 205:00 207:00**  
**213:00 227:00**

(52) UK CL (Edition K)  
**B6A AC31 AC51 AC53 AC54 AK**

(56) Documents cited  
**GB 1413587 A EP 0159828 A US 4523777 A**  
**US 3897964 A**

(58) Field of search  
UK CL (Edition K) **B6A AK ATC**  
INT CL<sup>5</sup> **B42D**

(54) **Credit, Identity or like cards**

(57) A plastics card, such as a credit or identity card, has a plurality of layers (13 to 18) of different colours with at least the top layer etched away in a pattern representing a personalised information such as a name, signature, photograph or finger print. The personalised information may be in machine readable code such as a bar code (23). The personalised information is etched using a laser having a wavelength in the infra-red range.

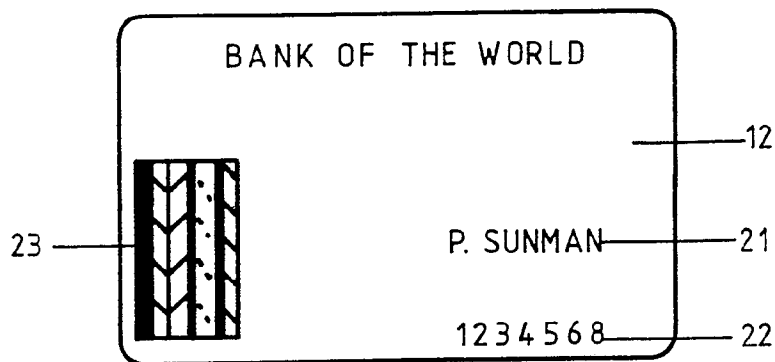


FIG. 1

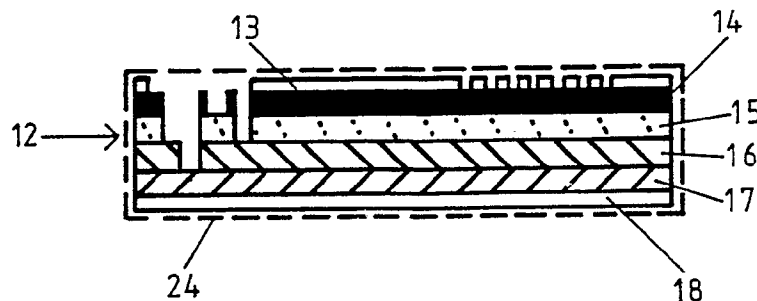


FIG. 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

GB 2 240 948 A

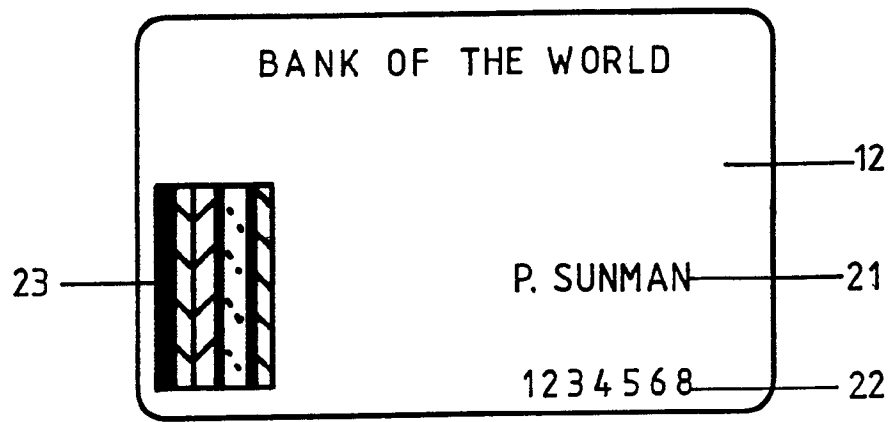


FIG. 1

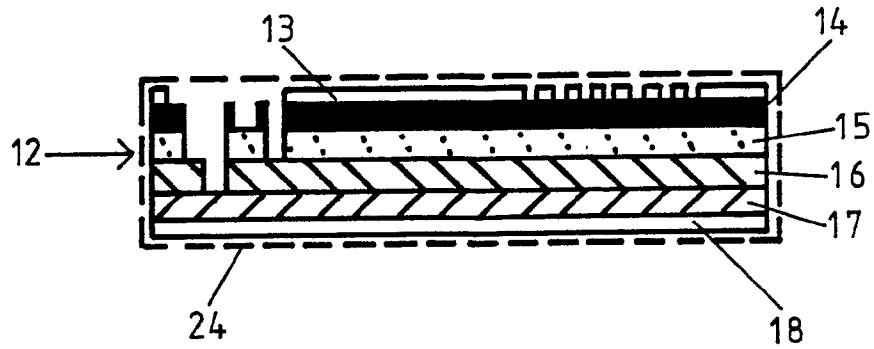


FIG. 2

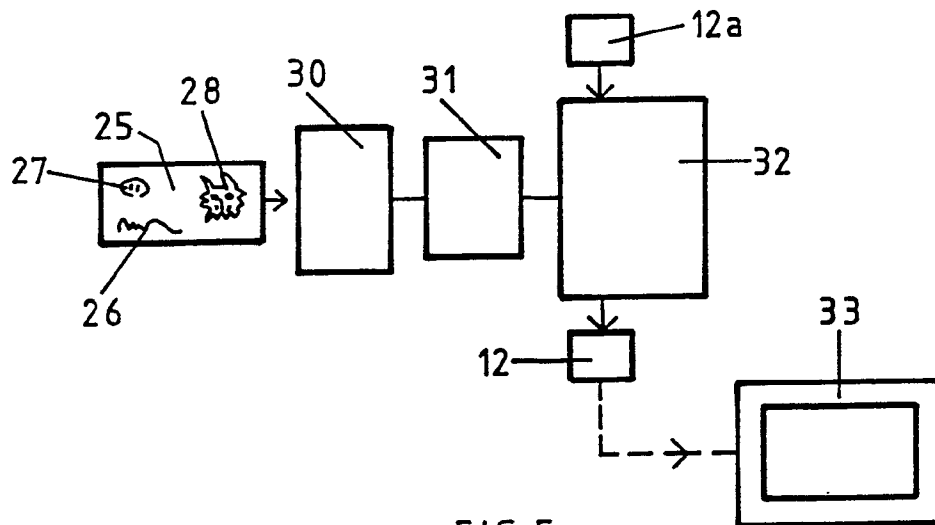


FIG. 5

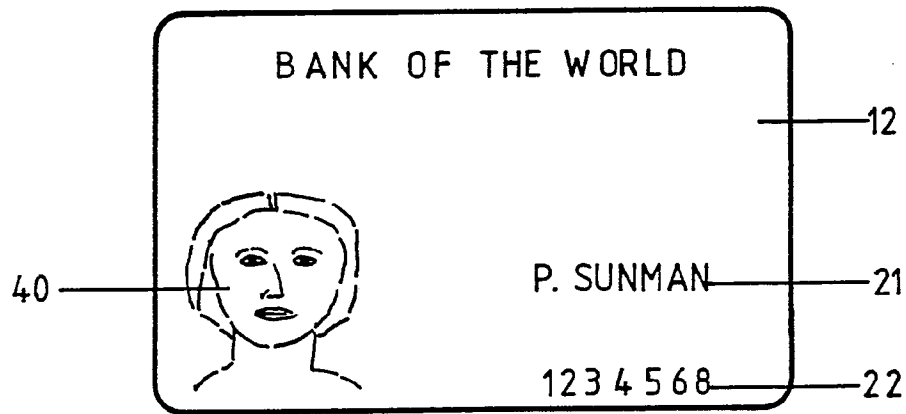


FIG. 3

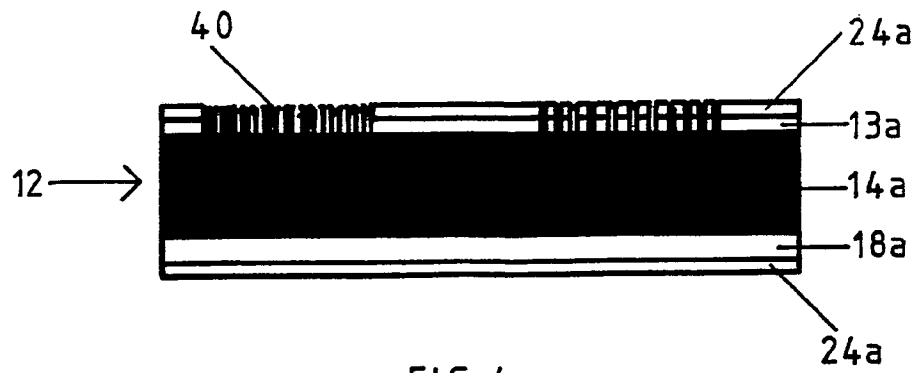


FIG. 4

## PLASTICS CARDS AND METHODS AND APPARATUS FOR MANUFACTURING SUCH CARDS

This invention relates to plastics material cards carrying individualised information, such as those normally used as credit cards, cheque guarantee cards, membership cards, warrant cards, identity cards and the like, hereinafter referred to as plastics cards, whether their construction be entirely of plastics material, laminated or otherwise, or contain other materials in the form of inks, dyes, paper cores or the like. Such cards normally have sufficient strength and durability and are of a size to be easily carried around in a purse or wallet, and be fed into and extracted from such devices as "Hole in the Wall" banking machines and manual imprinters without external support. The invention extends to methods and apparatus for making such cards.

Such cards normally have part of the personalised or individual information in alpha-numeric form marked thereon after their physical construction is otherwise complete, and this information is normally embossed so as to facilitate the automatic transfer of information by means of imprinters, thus avoiding the risk of misinterpretation and misreading inherent in the time consuming manual transcription.

With the introduction of optical character recognition (OCR) technology, it has become possible to use the imprinted data or the relevant part thereof for direct input into an automatic data processing system. Since much of this data is in compliance with an internationally recognised and specified format, it is possible for any system involved to interpret the appropriate part or parts of the data and process them accordingly, thus allowing information interchange on an international basis. The normal construction of these cards is of polyvinyl (PVC) and/or polyvinylchlorideacetate (PVCA) laminated plastics, or a material having equal or better performance characteristics, such as will resist physical deformation and

crushing and enable elastic return to flatness when used in an imprinter without functional impairment of the card. There exists a specification for construction of such cards where they are to be used as credit cards, namely BS5132.

Techniques which have been tried for personalising plastics cards include mechanically engraving, printing, charring and laser discolouration, but all of these suffer from various disadvantages either from the security viewpoint or from that of the aesthetics, and all can be tampered with successfully with relatively little effort.

An integral part of some cards within the genre is the signature patch, which is a strip on the reverse of the card upon which the putative owner enters his signature for subsequent verification when the card is used in a transaction. This simplifies fraud, since a person stealing or otherwise unlawfully obtaining the card is faced with two helpful possibilities, either that he has a signature to copy which he can practice until perfect or, if the card has been obtained eg by postal fraud, there is no signature, so he can enter the card holder's name in his own handwriting.

An object of the present invention, in one aspect, is to provide a card carrying individualised information and a method of making such card, which is cheap to manufacture, and is not easily tampered with. In another aspect the invention aims to provide a card and a method of making such a card which includes personalised information in a machine readable code in addition to any OCR data.

In one aspect the invention provides a plastics card comprising a plurality of layers of plastics material, having contrasting colours, bonded together, the card being etched away to remove an outer layer or layers, to expose a contrasting inner layer or layers in a pattern representing individualised information for example a name and account number. Preferably the individualised information includes a reproduction of one or more of a signature, a photograph, a finger print, a retinal print, or DNA or other genetic data information, preferably in machine readable code. Where

there are several inner layers of different colours the information can be in several colours. Where there is a single inner exposed layer this is preferably a dark shade normally black.

The etching may be carried out cheaply and at high speeds such as would be required for a production run using various techniques, preferably laser cutting using a laser whose wavelength lies in the infra-red. Alternatively waterjetting could be used. The resulting information is indelible, extremely difficult to alter and removes the need for embossing, together with the concomitant risk of flattening and re-embossing of the card by persons intending to use the card for fraudulent purposes.

In another aspect the invention provides a plastics material card including thereon personalised information in the form of a reproduction of a signature, finger print, photograph, retinal print, or DNA or other generic information stored thereon in machine readable code other than OCR.

Such personalised information can be read on a reader capable of interpreting the machine readable code and displaying it on a VDU so that it can be compared for example with an original signature or a person presenting the card.

In another aspect the invention provides a method of marking personalised information on a plastics card having a plurality of layers of material of different colours bonded together, which comprises etching the information onto the card by removing one or more of the layers under control of a processor in which the information is stored, in a pattern which reproduces the information.

In a further aspect the invention provides apparatus for making a card which comprises processor means for reading personal information such as a name, signature or photograph digitising and storing such information, and etching means under control of the information from the processor for reproducing the information on a card having a plurality of layers of different colours bonded together. Preferably the

etching means comprises a laser whose wavelengths lies in the infra-red region.

The etching is preferably performed using either a CO<sub>2</sub> or CO laser, preferably a 10.6 micron carbon dioxide laser. We have found that with the latter device the thermal component of the beam is much greater than say that of an Nd-YAG laser, with the result that when etching through from a light coloured opaque layer to a darker core, the heat of the carbon dioxide laser volatilises the plastic, rather than "exploding" it, producing a very clean, effective and aesthetically pleasing cut. The Nd-YAG laser produces more irregular and jagged edges and cuts. However other laser wavelengths are available and may be used. Because of the nature of the techniques employed, characters can have a stroke width from 50 microns upwards, thus enabling high information density to be achieved, as well as permitting characters having a stroke width of 510 microns, in accordance with the BS5132 part 1, to be reproduced on or in the card. Many cards have a clear transparent overlay laminated front and rear and the highly directed focusing and energy level controls of the laser make it possible to create personalised information through and beneath an outer layer, post lamination, while avoiding damage to the outer layer. The surface of the top opaque layer may be preprinted with information such as house colours and logos of the issuing authority.

Where the card has a plurality of different layers of contrasting colours on the grey scale a monochrome photograph may be reproduced on the card (or where the layers are of different colours, a coloured photograph) by employing laser techniques to expose the contrasting layers differentially. Alternatively with a single core layer a half tone picture or photograph can be reproduced using dots (of say 50 microns) and varying their density.

The core layers, or additionally the opaque outer layer may include fluoresceins for additional security.

Such a card can include a magnetic strip, a

conventional signature strip or other such strips or areas and can have non-etched information printed on it.

Two embodiments of card, in accordance with the invention, will now be described, by way of example only, with reference to the accompanying diagrammatic drawings of in which:-

Figure 1 is a plan view of one card,

Figure 2 is a section through the card with the thickness very much exaggerated to show the individual layers,

Figure 3 is a plan view of another card,

Figure 4 is a view similar to that of Figure 2 through the card of Figure 3, and

Figure 5 is a schematic block diagram of apparatus for producing and reading the card.

A card 12 of plastics material such as polyvinylchloride (PVC), of conventional credit card size that is approximately 8.5 x 5.4 cms, with a thickness of 760 to 800 microns, is made of a plurality of opaque layers of material bonded together. The layers comprise a top layer 13 a plurality of inner layers 14, 15, 16, 17 and a backing layer 18. There may be a single inner layer or many more very thin inner layers. The top layer is of a contrasting colour to the inner layers and the inner layers are all of different colours from one another, preferably the top layer is a light colour such as white and the inner layers are darker and of different colours from one another on the grey scale. The top layer may be printed with information which is common to all the cards of a set for example as seen in Figure 1 the words "Bank of the World" the card also carries individual, personalised information in alpha-numeric characters such as a name as indicated at 21 and a number as indicated at 22. The card additionally carries information in machine readable code such as the bar code indicated at 23. At least some of the individualised information is entered on the card by etching to remove the top layer 13 and expose portions of the inner layer or layers in a pattern to



convey the required information. The etching may be carried out by a laser, water jets or other known means and where there is only one inner layer will all be carried out to the same depth to expose that inner layer. Where there are a multiplicity of layers of different colours the etching will be carried out to different depths to expose the layer of the required colour at the required position. Where the layers are of different colours on the grey scale this enables grey scale pictures to be reproduced on the card allowing machine readable coloured pictures and machine readable codes such as bar codes to be reproduced.

The card can be covered in a transparent layer as indicated in broken line at 24, either before or after etching.

The card of Figures 3 and 4 has a single black core layer 14A laminated between opaque lighter coloured layers 13A, 18A and top and bottom transparent protective layers 24A. The core layer is thicker for example 400-500 microns thickness with the other layers having thicknesses in the range 75-100 microns. A half tone photograph 40 is etched on the card using dots etched through the layers 24A and 13A.

As well as the name and account number of a card holder a signature, fingerprint or other picture can be produced on the card (possibly in machine readable code). For this purpose an information sheet 25 bearing the name and other individual details, such as an account number, together with a signature 26, a fingerprint 27, and/or a photograph 28 or other personalised details is supplied to a CCD Camera 30 which reads the information, passes it to a processing unit 31 which converts it to a digitised (machine readable) form and stores it. It may store it in the form of a digitised picture on the grey scale. Normally at a remote position to which the stored information is supplied, a supply of card stock 12a, possibly preprinted with information common to all the cards, is supplied to a laser or other etching means 32 controlled by the information from the processor so that the personalised information is etched

onto the card as described above. Preferably the laser is a CO<sub>2</sub>, 10.6 micron laser and is controlled with galvanometric beam steering using flat optics. The laser may write letters or numbers by making cut lines or may drill discrete dots. If the cards 12 have been personalised with the information in machine readable code they can be fed into a reading device 33 which can translate the personalised information such as a signature or photograph into a picture displayed on a VDU so that it can be compared with an original signature or the person presenting the card.

CLAIMS

- 1        A plastics material card comprising a plurality of layers of material of different colours bonded together the card being etched to remove an outer layer and expose an inner layer in a pattern representing individualised information.
- 2        A card according to claim 1 in which the individualised information includes a reproduction of one or more of a signature, a photograph, a fingerprint, a retinal print, or DNA or other genetic data information.
- 3        A card according to claim 1 or claim 2 in which the individualised information is in machine readable code.
- 4        A card according to claim 3 in which the machine readable code includes a bar code.
- 5        A card according to any of claims 1 to 4 in which the etched information includes OCR printing.
- 6        A card according to any of claims 1 to 5 having an inner core layer which is darker than an outer opaque layer.
- 7        A card according to claim 6 in which there is a single inner substantially black core layer.
- 8        A card according to any of claims 1 to 7 in which at least one layer includes fluoresceins.
- 9        A card according to any of claims 1 to 6 including a plurality of inner layers of different colours on the grey scale.
- 10       A card according to any of claims 1 to 9 including individualised information in the form of a reproduction of a photograph produced by differential exposure of different layers or half tone dots etching to a single layer.
- 11       A plastics material card including thereon a reproduction of a signature, fingerprint, photograph, retinal print or DNA or other genetic information stored thereon in machine readable code.
- 12       A plastics material card substantially as described herein with reference to or as illustrated in any of Figures 1 to 4.

13 A method of marking personalised information on a plastics material card having a plurality of layers of material of different colours bonded together, which comprises etching the information on the card by removing parts of at least one layer, under the control of a processor in which the information is stored, in a pattern which reproduces the information.

14 A method according to claim 13 in which the pattern is etched using a laser in the infra-red range.

15 A method according to claim 13 or claim 14 in which the card has a plurality of layers of different colours on the grey scale and the pattern is etched to remove the layers differentially by laser means.

16 A method according to any of claims 13 to 15 used to form a card according to any of claims 1 to 12.

17 Apparatus for marking a card according to any of claims 1 to 12 which comprises processor means for reading personalised information such as a name, signature or photograph and digitising and storing such information, and etching means under the control of the information from the processor means for reproducing the information on a card.

18 Apparatus according to claim 17 in which the etching means comprises a laser having a wavelength in the infra-red range.

19 Apparatus for marking a card substantially as described herein with reference to or as illustrated in Figure 3 of the accompanying drawings.